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ABSTRACT

Three methods of teaching an inservice teacher education course, Principles of Teaching Industrial Subjects, were compared for their influence on informational achievement, teaching performance, attitude toward the course and method of presentation, and cost. Fifty-five vocational teachers were divided into three groups, each taught during a semester by one of the following methods: telelecture each week, alternate weeks of telelecture and traditional face-to-face lecture-discussion, or face-to-face lecture-discussion each week. Telelecture enables an instructor to communicate verbally and graphically with inservice teachers at a remote location through two-way telephones and a Victor Electrowriter Remote Blackboard. Analysis of pre- and posttests showed no significant differences among the three groups in achievement, performance, or attitude. However, the telelecture is more economical in instructor costs and travel time and is recommended as a means of teaching professional extension courses. The posttests--a midterm exam, final exam, and the rating scale used to evaluate videotaped performance tests--are appended. (LP)

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FINAL REPORT
Project No. 9-F-106
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A STUDY TO ASCERTAIN THE FEASIBILITY OF INCORPORATING TELELECTURE IN PRESENTING A TEACHING METHODS COURSE

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A special note of acknowledgment is due the writer's project director, Dr. H. H. London, Professor of Industrial Education, who was willing to devote a generous amount of time, provide wise counsel, personal interest, and guidance, during the planning and writing of this study.

CHAPTER I

SUMMARY

The purpose of this study was to ascertain whether or not it is feasible for students to receive instruction in a professional teaching methods course, F390 Principles of Teaching Industrial Subjects, by either 100 per cent telelecture or a combination of 50 per cent telelecture and 50 per cent face-to-face lecture without detriment to, but with possible advantages to, the learning process when compared to students who receive instruction by the more conventional face-to-face lecture-discussion approach.

The study sought answers to the following questions:

1. How do the varying degrees of experimental treatment (telelecture) compare with the control method (face-to-face lecture) with respect to cognitive outcomes--knowledge, comprehension, and application--when three heterogeneous groups are studied?

2. How do the methods compare between degree and non-degree students with respect to application of teaching techniques?

3. What are the attitude outcomes--satisfaction, dissatisfaction or any emotions toward this course--as expressed by the experimental and control groups?

4. How do the varying degrees of experimental treatment (telelecture) compare with the control method (face-to-face lecture) with respect to cost?

The study was conducted as a controlled experiment involving three groups of teachers enrolled in F390 Principles of Teaching Industrial Subjects. The course was offered through extension by the Department of Practical Arts and Vocational-Technical Education,

University of Missouri--Columbia, in cooperation with the U.S. Office of Education, Research Division; the Extension Division of the University of Missouri--Columbia; and the State Department of Education, Vocational Division, Jefferson City, Missouri.

The researcher served as the instructor for all three groups and taught one class (control group-A_1) at Marshall through the traditional face-to-face lecture-discussion. A second class (experimental group-A_2) was taught at Kansas City 50 per cent of the time by face-to-face lecture-discussion and 50 per cent of the time by telelecture. The third class was taught simultaneously at Hannibal-Joplin (experimental group-A_3) by the 100 per cent telelecture method.

This three-group controlled experiment was designed to allow the experimenter to make initial group measurements, to employ three different teaching methods, and to make post-treatment measurements. All relevant factors except the three different methods of presenting the course content were held constant or controlled insofar as possible.

The research population consisted of fifty-five adults. Of this group fifty-three students were in-service vocational instructors and two were seeking certification credits. They represented a composite of twenty different school districts in the State of Missouri and one school district in the State of Kansas. The three classes were conducted during the fall semester of 1969-70.

Comparisons were made between the relative effectiveness of the three teaching methods in terms of achievement levels and attitudes as measured by a combination of written and performance tests. The criterion variables upon which the comparisons were based were: (1) informational achievement, (2) performance of teaching capabilities, (3) attitude toward the course, and (4) attitude toward the practice used to present the course.

The initial status of the groups was assessed by measurements relative to scholastic aptitude and attained knowledge of the course content. The Otis Employment Test Two, Form B, was utilized to measure scholastic aptitude and a teacher-made pretest, based on the course objectives, was administered to obtain data regarding knowledge of course content.

The teaching sequence followed the stated course objectives and the instructional units of the course syllabus. The same course content was presented to all three groups.

Evaluation procedures consisted of two posttests in the form of a midterm and a final examination, along with two performance tests. These scores were combined to provide data for comparisons between the three differential treatment groups.

The performance tests provided each student the opportunity to demonstrate his/her ability to apply the teaching techniques discussed during the course by presenting a simulated class lecture and a demonstration of a manipulative operation. These performances were recorded on video tape and rated by three industrial education specialists. The performance test scores were also used to make comparisons between degree and non-degree students relative to their teaching capabilities.

Attitudes, toward the course and toward the practice of offering the course by varying degrees of telelecture or traditional methods, were assessed by Remmers' Scale for Measuring Attitude Toward Any School Subject, Form A, and Remmers' Scale for Measuring Attitude Toward Any Practice, Form A.

All records were under the supervision of the experimenter.

Summary of Findings

The one-way analysis of variance and F-tests, applied to the scores made on the Otis Employment Test and a pretest, indicated that no significant difference existed between the three groups with respect to scholastic aptitude and prior knowledge of the course content.

An analysis of the results of the posttests and teaching performance tests, which were given to obtain a final measure of informational achievement, indicated no significant differences with respect to cognitive outcomes of knowledge, comprehension, and application between the differential treatment groups.

The statistical application of the chi-square test to scores made on the teaching performance tests revealed no significant difference with respect to the application of teaching techniques between degree and non-degree students.

The one-way analysis of variance and F-tests applied to the ratings obtained from the Remmers' Scale for Measuring Attitude Toward Any School Subject, Form A, indicated no significant difference with respect to attitude toward the course between the differential treatment groups. Likewise, the application of similar statistical analysis to the ratings obtained from the Remmers' Scale for Measuring Attitude Toward Any Practice, Form A, resulted in an F-test value which indicated no significant difference with respect to attitude toward the practice of offering the course by extension during the fall semester of 1969-70.

The cost projections indicate that costs are dependent upon the type of transmitting and receiving equipment used and the number of support personnel required. The equipment and procedures used in this experiment resulted in a net savings of $1130.79 when compared to a traditional teaching schedule.

The travel time analysis for instructional personnel indicated a savings of three hundred and eight hours of automobile travel time during this experiment when compared to a regular travel schedule.

Summary of Conclusions and Implications

Based upon the findings of this study, the implications are that a professional course such as F390 Principles of Teaching Industrial Subjects may be presented to heterogeneous groups by either the traditional method of face-to-face lecture-discussion; by combining 50 per cent face-to-face lecture-discussion with 50 per cent telelecture presentations; or by presenting the entire course by telelecture methods. The mean achievement levels appear to be equivalent, the adult student attitudes were positive, and under the conditions of this experiment, telelecture was more economical in costs and in teacher travel time. Therefore, administrators may consider utilization of telelecture as a medium

to offer professional teaching methods courses without being deterred by questions of levels of achievement, adult attitudes, or excessive costs.

CHAPTER II

INTRODUCTION

Recruiting and preparing a sufficient number of new vocational teachers has been a major task of colleges and universities since the Vocational Education Act of 1963 became operative in 1965. With the passage of the Vocational Education Amendments of 1968 and the continued expansion of vocational-technical education in the United States, this task continues to be relevant. One of the findings of the Advisory Council on Vocational Education was:

> The total number of vocational education teachers in the United States was 124,042 for the fiscal year 1966. This number represented an increase of 13.7 per cent over the previous year. The number of vocational education teachers is expected to increase by at least 150 per cent during the next decade.
>
> It is evident that the States must expand and improve plans for teacher education to meet future requirements. Particular emphasis needs to be placed upon finding new sources of vocational teachers, in-service teacher education, flexibility in State certification, and in the selection and upgrading of teacher educators.[1]

Teachers of agriculture and home economics are usually prepared in a structured college program prior to teaching employment. Teachers in the health fields and in business education usually prepare by a combination of college and on-the-job experience. Because of many divisions of distributive and trade and industrial education areas, the content is not often taught in college; it is learned through individual efforts and actual work experience, and usually before consideration

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[1]The Advisory Council on Vocational Education, Notes and Working Papers Concerning the Administration of Programs Authorized Under Vocational Education Act of 1963, Public Law 88-210, As Amended (Washington: U. S. Government Printing Office, 1968), p.85.

of teaching as a career. Therefore, becoming a teacher is a redirection in employment, and "the majority obtain teacher education while employed as teachers rather than through the regular curriculum."[2]

There are tradesmen and trade teachers needing teacher education, and there are other individuals with various occupational competencies and educational levels seeking to qualify as vocational-technical teachers. In addition, there are those previously certified desiring upgrading through in-service training. To assemble and train such a heterogeneous group calls for a modernized and concerted effort with maximum utilization of teacher-educator personnel.

Statement of the Problem

Should professional courses such as Principles of Teaching Industrial Subjects be taught only by face-to-face methods or may telelecture be introduced into the teaching sequence? Will students enrolled in extension classes who are at degree and non-degree levels of educational attainment respond in a comparable manner?

There is a long tradition of using the face-to-face lecture-discussion method for teaching professional education courses. In actual practice, this method has evolved to also include supplementary audiovisual aids as may be available or within the desires and capabilities of individual instructors. Primarily, this traditional method of teaching has utilized visual and auditory cues in the learning process and interaction facilitated through discussion.

Because of technological advances in communications, it is now operationally possible to simulate face-to-face lecture-discussions by other methods such as telelecture in conjunction with the Victor Electrowriter Remote Blackboard. These advancements indicate that it may be possible to utilize telelecture when teaching a professional course. It is possible that the cost factor might make this impractical.

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[2] Ibid., p. 218.

Since empirical data concerning the relative advantage of telelecture are lacking, there is a need for research to investigate a feasible level whereby this medium may be introduced into the regular teaching sequence without entailing excessive expense.

Definition of Terms

In-service Teacher Education. Instruction and supervision for employed instructional personnel, for the purpose of improving their professional abilities.[3]

Performance Tests. A method of evaluation, based upon predetermined criteria, which provides an opportunity for the student to demonstrate his ability to apply such things as techniques, concepts or principles.[4]

Professional Education Courses. Courses that deal with the study of the history, philosophy, psychology, content, methods, etc., of education.[5]

Teacher-Educator. A qualified professional person responsible for the preparation and in-service training of teachers. He helps teachers or prospective teachers to secure the professional knowledge, abilities, understandings and appreciations which will enable him to qualify for professional employment or advancement in teaching positions.[6]

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[3]American Vocational Association, Definitions of Terms in Vocational, Technical, and Practical Arts Education (Washington: American Vocational Association, 1963), p. 12.

[4]G. Harold Silvius and Ralph C. Bohn, Organizing Course Materials for Industrial Education (Bloomington, Illinois: McKnight and McKnight Publishing Company, 1961), p. 361.

[5]American Vocational Association, op. cit., p. 15.

[6]Ibid., p. 19.

Vocational Education. Either a program designed specifically to provide opportunities: (1) for individuals to select an occupation, (2) to secure the necessary preparation, and (3) to make the initial entry into gainful employment, or a program to upgrade those already employed; both of which pertain to those occupations generally requiring less than a baccalaureate degree.[7]

Vocational Education Act of 1963. Its declared purpose of federal grants to the states was to develop an adequate vocational education system so that persons of all ages in all communities of the state . . . will have ready access to vocational training or retraining which is of high quality, which is realistic in the light of actual or anticipated opportunities for gainful employment, and which is suited to their needs, interests and ability to benefit from such training.[8]

Vocational Education Amendments of 1968. Authorized federal grants to states which incorporate in a single enactment virtually all assistance toward training and education for employment. It relates education to current and emerging needs, focuses upon both area and individuals most in need of modern vocational-technical education, requires involvement of strong and independent citizens' advisory councils to oversee its administration at federal and state level; and it greatly increases both the programmatic and financial support available to modernize and upgrade vocational-technical instruction.[9]

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[7]United States Ninetieth Congress, Second Session, Conference Report #1938 to accompany H. R. 18366 (Washington: U. S. Government Printing Office, October 2, 1968), Section 108.

[8]United States Department of Health, Education and Welfare, Office of Education, Education for a Changing World of Work, Report of the Panel of Consultants on Vocational Education (Washington: U. S. Government Printing Office, 1964), pp. 206-214.

[9]Mary P. Allen, "Vocational Education Amendments of 1968," American Vocational Journal (November, 1968), pp. 45-46.

Telelecture (experimental method of teaching). Telelecture is the shorthand for a process which makes meetings by voice possible. This method of teaching has evolved to mean the utilization of the following:

1. Telephone Transmitters and Receivers. Voice is transmitted by special devices installed on regular telephones over telephone lines and is then amplified by receiver units at the receiving station. This makes possible two-way conversations between teacher and students at remote locations.

2. VERB (Victor Electrowriter Remote Blackboard). An electronic device which makes it possible for an instructor to write, draw, solve problems or present information in any other graphic way to audiences in remote locations. It reproduces simultaneously any written or drawn materials created by the instructor by a receiving unit built into an overhead projector which reproduces enlarged images of the material on a projection screen.[10]

Lecture-discussion (control method of teaching). A manner of instruction that utilizes a combination of the following:

1. Lecture. A method of teaching by which the instructor gives an oral presentation of facts or principles, the class usually being responsible for note taking.

2. Discussion. Group discussion that is controlled by its leadership, with a fixed agenda, or some other group structure, to move through its agenda.[11]

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[10]Philip Lewis, "Telecommunications: New Party Line for Education," Nations Schools (September, 1966), pp. 114-116.

[11]Carter V. Good (ed.), Dictionary of Education (New York: McGraw-Hill Book Company, 1959), pp. 178, 314.

Related Literature

The investigator found two studies that are sufficiently related to provide some direction to this experiment, even though they are not specifically applicable to Principles of Teaching Industrial Subjects or the usual heterogeneous group seeking vocational certification. In addition, there are reports of telelecture applications which also contribute to over-all understanding.

Boswell and others[12] conducted a study at the University of Missouri--St. Louis to ascertain whether or not remote teaching can produce results comparable with those observed on the home campus following traditional lecture methods.

Three classes of Introductory Psychology were involved. One group was a control group which received a traditional lecture on the home campus. The second group, also on the home campus, received a live lecture which was simultaneously transmitted to the third group located in a remote classroom. This design allowed a comparison of group 1 versus group 2 to assess the effects of hardware in transmission class, plus any effects of the remote hook-up. These effects were found to be negligible, so group 1 plus group 2 versus group 3 were compared to ascertain whether or not remote teaching produces results which are comparable to live lecture presentation.

The main dependent variable employed in this study was test score. Both pretest and posttest were administered to all groups. The results of the pretest indicated no significant difference in initial content knowledge among the groups. The posttest showed no significant difference among the groups after training.

The conclusion states, "Overall, these findings suggest that this remote teaching technique may be a valid aid to teaching and it showed itself to be an economical

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[12] J. J. Boswell and others, "Telelecture: An Experiment in Remote Teaching,: Adult Leadership, 16:321-22, 338 (March, 1968).

vehicle for educating adults in remote areas in the state."[13] Data were not reported to support the economical aspect.

Eldelman studied the question, "Can tele-lecture and electrowriter be utilized to make instruction by a single master teacher available simultaneously to groups of adults in multiple and far-flung communities? Specifically, can these electronic devices be used in teaching Hebrew reading and writing?"[14]

Three groups were used: the face-to-face lecture was given to group (1) in Chicago and simultaneously to group (2) in East Lansing and to group (3) in Grand Rapids.

Tests of achievement were compared on three objective criteria:

1. Scores on Midterm Test
2. Scores on Final Test
3. Ratings on Oral Reading Test
   a. Pronunciation
   b. Fluency
   c. Correctness

There was no significant difference among all mean criteria according to t-test of means.

Several demographic variables were considered which were collected by means of a questionnaire. Six of these variables were extracted from the questionnaire for the purpose of analysis to see whether or not they would differentiate the criterion performances. These variables were: sex, age, school grade completed, other languages spoken at home, number of languages studied, and total years of such study.

The researcher inferred that the technique was a success for students in East Lansing and Grand Rapids as was the usual method for students in Chicago.[15]

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[13] Ibid., p. 338.

[14] Lilly Eldelman, "Teaching Adults Via Tele-lecture and Electrowriter (Victor Electronic Remote Blackboard)," ERIC, ED 016 081 (May, 1967).

[15] Ibid.

Brown[16] reported on a class conducted by Education, Incorporated, under the auspices of the Appalachia Educational Laboratory in Charleston, West Virginia. This project was in-service training for teachers of Head Start who were introducing new language art materials (designed to teach language skills and beginning reading via programmed instruction).

The in-service course instructor had met all participants face to face, had considerable amounts of information about each and corresponded with students weekly. Reportedly, there was more communication between these student-teachers and their instructor than in typical college courses. Brown further reported that normally it would have taken five to ten years to muster the experience and training of staff necessary to install this advanced curriculum in these schools. It was accomplished by telephone in less than six weeks.

Longbotham and Moffett[17] at Texas A & M University have used telelecture to teach Physics, English Composition, Related Math, and Advanced Math to high school students. They observed that the secret of successful operation is the detailed planning which goes into each lesson. The teacher and curriculum assistant, who is a qualified teacher, work together to prepare a student manual, a teacher's manual, and the visuals which will be used in the lesson presentation. Lessons are sent out by telelecture; and 2" x 2" slides and overhead projector are made available to each receiving classroom. This makes for both student and receiving-teacher involvement.

Cook[18] reported in 1963 on the use of telelecture to present a lecture on an Atomic Reactor. The lecture was

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[16]Sandra M. Brown, "Telelecture, Appalachia's In-service Classroom of the Air," The Instructor (October, 1968), p. 126.

[17]Jack H. Longbotham and Thomas J. Moffett, "Harnessing 'Chalkless Blackboards' To A 15-School Instructional Network," School Shop (September, 1968), p. 67.

[18]Thomas G. Cook, "Tel-Lecture," Adult Leadership, 12:11-12 (May, 1963).

illustrated with slides. The lecturer had an identical set and viewed his at the same time they were being shown to the remote audience. A question-answer period was held following the lecture. The results of completed questionnaires showed that 66 per cent felt that telelecture was as effective as "in person" while 25 per cent reported "less effective." Cook advises to plan in detail, orient all helpers and the audience, show visuals even during the question and answer period; but telelecture should not be used to replace an individual who can reasonably attend the program.

Paulson[19] illustrates how a conference can be conducted by remote procedures. Prior to the presentations to the conference, participants had furnished film clips, slides and transparencies for projection. Upon prearranged signal these materials were projected on the screen. With the lights down in the room, the lecturer's voice seemed a part of the atmosphere. He felt that the most effective portion of the program was the question and answer periods. "Formal presentation could probably be done just as well by tape but a question and answer session can not be duplicated by other audiovisual aids."[20]

Purpose of the Study

The purpose of this study was to ascertain whether or not it is feasible for students to receive instruction in a professional course, Principles of Teaching Industrial Subjects, by either 100 per cent telelecture or a combination of 50 per cent telelecture and 50 per cent face-to-face lecture without detriment to, but with possible advantages to, the learning process when compared to students who had received instruction by the more conventional face-to-face lecture-discussion approach. A more complete description of these approaches is provided in Chapter III.

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[19] Robert L. Paulson, "Tel-A-Lecture Technique," Educational Screen and Audiovisual Guide (June, 1963), pp. 316-317.

[20] Ibid., p. 317.

The study sought answers to the following questions:

1. How do the varying degrees of experimental treatment (telelecture) compare with the control method (face-to-face lecture) with respect to cognitive outcomes--knowledge, comprehension and application--when three heterogeneous groups are studied?

2. How do the methods compare between degree and non-degree students with respect to application of teaching techniques?

3. What are the attitude outcomes--satisfaction, dissatisfaction or any emotions toward this course--as expressed by the experimental and control groups?

4. How do the varying degrees of experimental treatment (telelecture) compare with the control method (face-to-face lecture) with respect to cost?

Hypotheses

The research hypothesis under consideration in this study was as follows:

It is feasible to incorporate telelecture, as a medium, in the regular teaching sequence of a professional course, such as Principles of Teaching Industrial Subjects, when taught by extension, to combined groups of degree and non-degree students.

The research hypothesis was tested by accepting or rejecting the following null hypotheses:

Ho_1: There is no statistically significant difference between the face-to-face lecture method and varying degrees of experimental treatment (telelecture) with respect to cognitive outcomes of knowledge, comprehension, and application of the three heterogeneous groups as measured by combined written comprehensive tests and performance tests.

Ho_2: There is no statistically significant difference between degree and non-degree students receiving instruction by the face-to-face lecture method or varying degrees of experimental treatment (telelecture) in terms of application of teaching techniques as measured by performance tests.

Ho_3: There is no statistically significant difference between the face-to-face lecture method and varying degrees of experimental treatment (telelecture) with respect to attitude toward the course as measured by an attitude scale.

Ho_4: There is no statistically significant difference between the face-to-face lecture method and varying degrees of experimental treatment (telelecture) with respect to attitude toward the practice of presenting the course, by extension, during the fall semester of 1969-70, as measured by an attitude scale.

Scope of Study

The sample for this study was drawn from those adults in the state of Missouri who presented themselves, qualified, and indicated a need for this type of instruction. This is the regular procedure for class participants. A letter of concurrence from the State Department of Education, Vocational Division, is included as Appendix A.

Classes were conducted at the Area Vocational-Technical School, Marshall, for the control group receiving the traditional face-to-face lecture-discussion instruction. The experimental group receiving the 50 per cent telelecture and 50 per cent face-to-face lecture treatment met in the Troost Building, University of Missouri--Kansas City. The experimental group receiving the 100 per cent telelecture treatment, simultaneously, were at two locations: (1) the Area Vocational-Technical School, Hannibal, and (2) the Franklin Technical School, Joplin.

All students were enrolled during the fall semester of 1969-70. The length of the observation and teaching period was for the entire semester.

The generalizability of the study is limited to the extent that the samples were comparable, and to the extent that each sample was representative of its respective population. The degree to which the measuring devices were reliable and valid was a limiting factor, as was the extent to which the variables were controlled.

Need For The Study

The literature reviewed indicates a consensus of opinion, among the investigators, that telelecture has a potential for classroom use.

This study is an attempt to provide empirical evidence concerning the feasibility of incorporating telelecture into the regular teaching sequence when presenting a teaching methods course.

The need for vocational-technical teachers is expected to increase by at least 150 per cent during the next decade. Techniques must be developed to further utilize the available teacher-educator time in preparing potential teachers, providing in-service education, and retraining those presently in the teaching field deficient in certification requirements.

There is a need to practice and perfect techniques of presentations via telelecture. There is a need to try out the teaching materials to ascertain their compatibility between face-to-face instruction and telelecture, and to see if the teaching sequence flows uninterrupted while allowing for flexibility of teacher-student contact time.

Administrators need data upon which to base decisions for class scheduling and potential use of media and teaching personnel in various combinations. Cost data are also needed.

CHAPTER III

RESEARCH METHODS AND PROCEDURES

This study was designed to be experimental in nature. The experimenter had the power to randomly assign and manipulate the treatments to the three groups under observation. This approach permitted the experimenter to make initial group measurements, to employ three different methods of teaching, and to make post-treatment measurements.

Through the design of the study, pretests, and the statistical technique employed in the analysis of data, an attempt was made to control all variables except the effect which the experimental treatment (varying degrees of telelecture) and the traditional treatment (face-to-face lecture-discussion) had upon selected criterion variables.

The groups studied were geographically dispersed and pre-experimental equivalence of the groups was lacking. The design permitted the use of intact classes. In this manner, potential group differences could be controlled by pretests and analysis of covariance. Other control factors were the common elements for all students participating in the experiment as follows:

1. Enrollment procedures
2. Instructor
3. Text and reference materials
4. Course content
5. Instructional aids
6. Reading and laboratory assignments
7. Tests
8. Midterm and final examinations
9. General class procedures
10. Duration of the observations
11. Time of day for class sessions

The effects of other elements which may have had a contributing effect upon the experiment, and which were beyond the control of the investigator, were assumed to be either randomly distributed between the three groups or controlled by the research design and the statistical

procedure. Kerlinger[1] graphically describes this design paradigm as follows:

Methods					
A_1		A_2		A_3	
X	Y	X	Y	X	Y

The groups experiencing the three different treatment methods are represented by the symbols A_1, A_2, and A_3. The pretest and posttest observations are represented by X and Y.

Population Treatment

The treatment (experimental) variable of this study was the teaching method used in presenting the course content. Each of the three sections was taught using a different method.

One group (n=15) was taught by the traditional face-to-face lecture-discussion method during the semester (Group A_1). The instructor gave regular weekly lectures which covered the concepts and principles of the course content. All group discussions were arranged and controlled under the leadership of the instructor by his physical presence, sub-grouping, and the agenda to be discussed.

A second group (n=15) was taught by a combination of 50 per cent face-to-face lecture-discussion and 50 per cent telelecture (Group A_2). The same instructor met with the group on alternate weeks for the traditional face-to-face lecture-discussion sessions and taught the group alternate weeks via telelecture. The same course content as that presented to the other groups was covered each week. The variation of instruction was in the method of presentation.

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[1]Fred N. Kerlinger, Foundations of Behavioral Research (New York: Holt, Rinehart and Winston, Inc., 1964), p. 350.

A third group (n=25) was taught for the entire semester by the 100 per cent telelecture method (Group A_3). The instructor and course content remained the same as for the other two groups. Their instruction was presented by voice and the Victor Electrowriter Remote Blackboard, supplemented by means of the overhead projector. Course materials were shown to the students by the local class monitor upon cue from the instructor. Assigned group discussions, outside of telelecture time, were directed by student-chairmen appointed by the instructor. Student-teacher verbal interaction was facilitated by the two-way communication capabilities of telelecture. The variation of instruction was in the method of presentation.

Sources of Data and Criteria for Comparison

The study was conducted as a controlled experiment involving three groups of students enrolled in Education F390 Principles of Teaching Industrial Subjects during the fall semester of the 1969-70 school year. This course is a regular offering of the College of Education, Department of Practical Arts and Vocational-Technical Education, University of Missouri--Columbia. The course was taught by extension in cooperation with the Extension Division, University of Missouri--Columbia, the U. S. Office of Education, and the State Department of Education, Vocational Division.

The researcher, a regular staff member in the Department of Practical Arts and Vocational-Technical Education, served as the instructor for all three groups.

Students registered for the course and were assigned according to their location in the State of Missouri. The three instructional approaches to teaching a methods course were randomly drawn and assigned to the locations. The locations were as follows: (1) Marshall, Missouri; (2) Kansas City, Missouri; and (3) Joplin--Hannibal, Missouri.

A total of 57 teachers enrolled as students and were given pretests. They represented a composite of 21 different school districts. Of the original group, 55 completed the course and were administered all posttests. Two students were lost from the sample during the second week of the semester when they left the teaching field to return to their private businesses.

Comparisons between the relative effectiveness of the three teaching methods were in terms of achievement levels and attitudes. The criterion variables upon which these comparisons were based are as follows: (1) informational achievement, (2) performance of teaching capabilities, (3) attitude toward the course, and (4) attitude toward the practice used to present the course.

Statistical Techniques

In this study, as in other experimental designs, one objective is to ensure that the results observed may be attributable, within limits of error, to the treatment variable rather than to other causal circumstances.

There are two commonly accepted methods of control to ensure freedom from bias in experimental studies: (1) experimental procedures of randomization in the assignment of subjects to groups and the matching of subjects, and (2) statistical control when practical considerations such as geographically dispersed intact groups prevents the assignment of subjects to groups at random.[2] Analysis of covariance is such a method of control. The application of analysis of covariance provides for a statistical, rather than an experimental, method of control by adjusting for the effects of initial differences in the subjects under observation. Analysis of covariance and the t-test were the statistical techniques which the researcher planned to employ in the analysis of the data measuring informational achievement. However, analysis of the pretest data indicated that the three groups were not initially significantly different. Therefore, analysis of data for informational achievement was through the technique of one-way analysis of variance and F-tests in accordance with the procedure outlined by Ferguson.[3]

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[2]George A. Ferguson, Statistical Analysis in Psychology and Education (New York: McGraw-Hill Book Company, Inc., 1966), p. 326.

[3]Ibid., pp. 281-293.

Chi-square (two groups or more--independent) was the statistical technique used to test for the significance of relationships between degree and non-degree students on scores attained from performance tests, as outlined and explained in Tate.[4]

Analysis of variance and F-tests were the statistical techniques employed in the analysis of the data measuring the attitudes toward the course and the attitudes toward the practice, even though the scores on attitude tests may be ordinal variables. Ferguson[5] justifies this technique as follows:

> In psychological work many variables are in fact ordinal, although for statistical purposes they are, quite justifiably, commonly treated as if they were interval or ratio variables. For example, scores on intelligence tests, scholastic-aptitude tests, attitude tests, personality tests, and the like, are in effect ordinal variables, although they are commonly treated as if they were of the interval or ratio type.

Schedule of Classes

The State Department of Education, Vocational Division, contracts with the College of Education, University of Missouri--Columbia, for the services of teacher-educators from the Department of Practical Arts and Vocational-Technical Education. Administrators in the state request that extension classes be held at their school. The requests exceed the supply of teacher-educators; therefore, classes are approved on a merit basis after conferences between State Department and University officials. For this experiment, the four sites of Hannibal, Joplin, Kansas City, and Marshall were chosen in

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[4]Merle W. Tate, Statistics in Education and Psychology (New York: The Macmillan Company, 1965), pp. 296-299.

[5]Ferguson, op. cit., p. 15.

the regular manner. Three separate sessions each week were to be taught. The last two groups to be drawn were to receive the 100 per cent telelecture (experimental method) simultaneously.

The method of teaching was randomly drawn with the results as follows:

Group A_1: The traditional face-to-face lecture-discussion method, Marshall.

Group A_2: The experimental 50 per cent face-to-face lecture-discussion and 50 per cent telelecture method, Kansas City.

Group A_3: The experimental 100 per cent telelecture method, Hannibal--Joplin.

The schedule of the classes is shown in Table I.

TABLE I

F390 CLASS SCHEDULE

Location	Method	Group	Time
Marshall	Traditional	A_1	6:30-9:30 p.m. T
Kansas City	Experimental	A_2	6:30-9:30 p.m. W
Hannibal--Joplin	Experimental	A_3	6:30-9:30 p.m. Th

Initial Status of the Population

The attempt to control for any initial differences between the three groups was through the strength of the research design, pretesting, and statistical control. These steps provided for a degree of control over the variables that were assumed most likely to affect the outcomes of the experiment. These variables were: (1) scholastic aptitude, and (2) knowledge of course content as

taught in F390 Principles of Teaching Industrial Subjects. Pretests were administered to obtain data for making initial comparisons.

Selection of Tests

Standardized and teacher-made tests were used for collection of data. Standardized tests were selected for measuring scholastic aptitude and attitudes because of their availability and the high degree of confidence commanded by tests which have been developed and authenticated for reliability and validity. A teacher-made test based upon the course objectives was developed and used as a pretest-posttest to measure informational achievement in combination with a performance test.

Scholastic Aptitude. Most tests that have been developed for predicting a student's ability to learn have been based upon the ability to understand and manipulate abstract symbols such as word meanings or verbal relationships. This is not the only factor for predicting success, but it is probably the most important single factor.[6]

The Otis Employment Test provides a measure of aptitude and it was selected for this purpose. The Otis Employment Tests correspond to the two types of Otis Self-Administering Tests of Mental Ability, with Test Two being the Higher Examination series. There are four alternate forms of equal difficulty. For this experiment, Test Two, Form B was used.

Yates, in a review of the Otis Quick-Scoring Mental Ability Tests, reported a reliability coefficient of .91. He indicated that in certain circumstances these tests can be used with advantage as follows:

> If it is required, for example, to segregate pupils into relatively homogeneous groups for teaching, administration, or research purposes,

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[6]William J. Micheels and M. Ray Karnes, Measuring Educational Achievement (New York: McGraw-Hill Book Company, Inc., 1950), p. 29.

> tests of this kind can afford a satisfactory rough classification. They would be especially advantageous in circumstances in which little is known about the pupils' previous attainment or at the outset of a new type of course, when knowledge of previous attainment is not necessarily predictive of the likelihood of success.[7]

These circumstances were present for this experiment.

Informational Achievement Pretest. Standardized tests specifically designed to measure attainment and background, based on the course content and course objectives, were not available. Therefore, the experimenter developed an objective-type test using the general principles of test construction as outlined in Micheels and Karnes.[8] The test was reviewed by four members of the Department of Practical Arts and Vocational-Technical Education staff, with the course outline and course objectives as aids in their evaluation process. All suggestions and criticisms were considered, and in its revised form it was believed that the test would provide a valid measure of informational achievement as indicated by the course objectives. Predetermined reliability coefficients were not available; however, through the application of the Spearman-Brown formula to the posttest scores, a reliability coefficient of .84 was obtained by the total population sample.

Performance Test. Oral performance tests were used in conjunction with the written informational achievement tests as an additional means to assess achievement in terms of the students' ability to make application of the teaching techniques taught during the experiment.

Attitude Scales. A measure of the students' attitude toward the course was obtained by using Remmers' Scale for Measuring Attitude Toward Any School Subject, Form A.

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[7]Oscar Krisen Buros (ed.), The Fifth Mental Measurements Yearbook (Highland Park: The Gryphon Press, 1959), p. 362.

[8]Micheels and Karnes, op. cit., pp. 126-157.

Likewise, a measure of the students' attitude toward the practice of offering the course by different teaching methods was obtained by using Remmers' Scale for Measuring Attitude Toward Any Practice, Form A.

These attitude scales consist of 17 items which are arranged on a continuum of extremes with a maximum value per item from 10.3, a very affirmative attitude, to a low of 1.0, a very negative attitude. The indifference point on all scales is 6.0.

The reliability coefficient is indicated to range from .71 to .92. The validity of the scales was described as follows:

> Beyond their face validity, these scales have demonstrated validity both against Thurstone's specific scales with which they show typically almost perfect correlations and in differentiating among attitudes known to differ among various groups.[9]

Administering and Scoring of Pretests

The experimenter met with each of the three groups to complete enrollment procedures during the first week of the semester. The enrollment forms were completed and the course content and course requirements were explained and discussed. The students were advised that measurements were needed to ascertain how much informational achievement pertaining to the course content each student had previously attained, so that a meaningful experience for each student could be designed by the instructor rather than repeating information already achieved. They were also advised that the Otis Employment Test would be administered to obtain scores to make comparisons between the potential capabilities of each group.

The students were assured that the results of the tests would not affect their course grades, but that they were to try to do their best according to the instructions

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[9] H. H. Remmers, Manual For the Purdue Master Attitude Scale (West Lafayette: University Book Store, 1960), p. 6.

given and according to difficulty of the test items. The regular class session of the following week was designated as the time to complete the pretests.

During the second class session, the directions accompanying the Otis Employment Test were read aloud to each of the three groups by the experimenter and each student completed the sample questions. They were given a final admonition that the results would have no bearing upon their final course grade; they had exactly 30 minutes to complete the test; they were to do their best and they were to stop promptly when told to do so at the end of the time allotted. The students placed the answers directly in the spaces provided on the face of the Otis Employment Test. They were later scored under the supervision of the experimenter by using an answer template.

After the Otis Employment Tests were completed, a twenty-minute break was allowed for the students to refresh themselves and relax. Following this period, the instructions for the informational achievement pretest were read aloud and students were given the opportunity to ask questions. A final admonition from the experimenter was that they were not expected to know the answers to all of the questions; they were to do their best and were free to leave the room upon completion, with no time limit imposed for completing the test. Their answers were marked on a standard answer sheet and were machine scored through the facilities of the Missouri State-Wide Testing Service.

Instructional Sequence

The face-to-face lecture-discussion group (Group A_1) met each week on Tuesdays at Marshall between 6:30 and 9:30 p.m. The allotted lecture materials were covered and discussion was either student or teacher initiated. The same materials were then presented to the two experimental groups. Group A_2 at Kansas City received their lectures alternately between face-to-face lecture-discussion methods and telelecture methods on Wednesdays between 6:30 and 9:30 p.m. Group A_3 at Hannibal and Joplin received their instructions via telelecture on Thursdays between 6:30 and 9:30 p.m. The experimenter maintained notes on pertinent student contributions; these were then shared with each group.

The course objectives served as instructional guides. (See Appendix B for copies.) Identical reading and group assignments were made to supplement the lectures, covering the nine units of the course content. (See Appendix C for copies.)

The Instructor and His Job[10] and Methods of Teaching Shop and Technical Subjects[11] were the texts used by all students. The students were expected to obtain the texts and be responsible for reading the assignments. Supplemental references were furnished each group. Handout materials were furnished to each student. The experimenter used various situations to ask questions of students, at random, to keep the reading of materials relevant.

Evaluation Procedures

The criterion variables as outlined on page 21, were measured to ascertain the feasibility of incorporating telelecture in the teaching sequence.

Informational Achievement Tests. These tests were administered as a midterm and a final examination. (See Appendix D for copies.) The items were taken from the pretest in proportion to the content covered at the point of testing. Forty items of the pretest were included in the midterm examination, and the remaining sixty items were included in the final examination. The tests were machine scored by the Missouri State-Wide Testing Service and records of the tests were maintained by the experimenter.

Performance Tests. Each student was required to give a simulated class lecture and a demonstration of a manipulative operation to show his/her ability to apply teaching techniques. A rehearsal before a television camera and a critique session, using a regular departmental

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[10]Homer C. Rose, The Instructor and His Job (Chicago: American Technical Society, 1966).

[11]Gerald B. Leighbody and Donald M. Kidd, Methods of Teaching Shop and Technical Subjects (New York: Delmar Publishers, Inc., 1966).

rating sheet, were allowed for each student. (See Appendix E for copies.) The actual presentations were then recorded on video tape at each class site. The esthetic quality of the tapes was not an experimental factor and was not considered in the individual ratings.

The video taped performances were rated independently by three industrial education specialists using the same departmental rating sheets as those used by the students as guides in their presentations. The industrial education specialists were:

Dr. Donald J. Amelon
Associate Professor of Industrial Education
Southeast Missouri State College
Cape Cirardeau, Missouri

Dr. William A. Downs
Assistant Professor of Industrial Education
Central Missouri State College
Warrensburg, Missouri

Dr. Richard A. Lyons
Assistant Professor of Industrial Education
Southwest Missouri State College
Springfield, Missouri

Prior to the ratings, which were completed in two consecutive days at the Columbia campus, the experimenter discussed the rating sheet and observation procedures with the specialists. Sample viewings and ratings were completed by the specialists to become familiar with the physical aspects of the viewing equipment and the observations needed for proficiency and accuracy in completing the rating sheets.

The specialists were given the name of the presenter, his subject area, and the title of each presentation. Only one student was known personally by one specialist. After the rating sessions began, no discussions of presentations were allowed between the specialists. The experimenter collected the rating sheets for each student immediately upon their completion. The resulting ratings were tabulated and recorded by the experimenter.

Attitude Scales. Two attitude scales were administered just prior to the administration of the final examination. The experimenter gave the same verbal

instructions to all of the groups. The first scale, Remmers' Scale for Measuring Attitude Toward Any School Subject, Form A, was given to ascertain the students' attitude toward the course, F390 Principles of Teaching Industrial Subjects. The second scale, Remmers' Scale for Measuring Attitude Toward Any Practice, Form A, was administered to ascertain the students' attitude toward the practice of offering the course by the different methods of face-to-face lecture-discussion or the varying degrees of telelecture. All individual scores were properly recorded and maintained by the experimenter.

CHAPTER IV

ANALYSIS AND COMPARISON OF RESULTS

The initial status of the population and the procedure followed in preparing for and conducting the experiment were explained in Chapter III. This chapter presents the analysis of data and comparisons of the results of the experiment.

Initial Status of Students

Data were obtained from the total population sample and were analyzed to ascertain whether or not there were initial differences between the three groups under observation relative to the two control variables, scholastic aptitude and informational achievement of course content. These data were analyzed by one-way analysis of variance and F-tests as previously described in Chapter III. Statistical significance of the obtained F-values were tested at the five per cent level of confidence, using the applicable degrees of freedom for each set of data.

The scores obtained from administering the Otis Employment Test, 2B, as a measure of scholastic aptitude, are shown in Table II. An analysis of these data in Table III indicates that there were no statistically significant differences between the groups relative to scholastic aptitude.

A composite listing of scores obtained from administering a pretest designed to measure initial informational achievement pertaining to the course content appears in Table IV. Data comparisons indicate that there were no statistically significant differences between the groups relative to informational achievement, a second control variable. An analysis of these data appears in Table V.

TABLE II

OTIS EMPLOYMENT TEST SCORES

Student Code	Scores Group A_1	Student Code	Scores Group A_2	Student Code	Scores Group A_3
101	23	201	45	301	57
102	36	202	39	302	41
103	58	203	47	303	64
104	51	204	52	304	53
105	65	205	60	305	42
106	37	206	54	306	36
107	45	207	23	307	56
108	35	208	51	308	28
109	38	209	29	309	60
110	58	210	40	310	44
111	60	211	50	311	25
112	58	212	23	312	54
113	47	213	40	313	46
114	32	214	69	314	28
115	33	215	25	315	16
				316	44
				317	47
				318	43
				319	70
				320	53
				321	29
				322	26
				323	42
				324	55
				325	50
$\Sigma X =$	676		647		1109
$\Sigma X^2 =$	32728		30561		53557

$\Sigma X_T = 2432$ $\quad \Sigma X^2_T = 116846$ $\quad C = 107538.6$

$SS_B = 28.9$ $\quad SS_W = 9278.5$ $\quad SS_T = 9307.4$

$n_1 = 15$ $\quad n_2 = 15$ $\quad n_3 = 25$ $\quad N_T = 55$ $\quad k = 3$

TABLE III

INITIAL STATUS OF DIFFERENTIAL
TREATMENT GROUPS ON SCHOLASTIC APTITUDE

Analysis of Variance Table

Source	df	SS	V	F*
Among Means Between Groups	2	28.9	14.45	.0809
Within Groups	52	9278.5	178.43	
Totals	54	9307.4		

*The F-value required for significance at the .05 level of confidence for 2 and 52 degrees of freedom is 3.18.

TABLE IV

COMPOSITE PRETEST SCORES OF INITIAL
INFORMATIONAL ACHIEVEMENT OF COURSE CONTENT

Student Code	Scores Group A_1	Student Code	Scores Group A_2	Student Code	Scores Group A_3
101	48	201	48	301	30
102	37	202	41	302	43
103	45	203	48	303	54
104	46	204	44	304	61
105	47	205	52	305	50
106	53	206	47	306	39
107	42	207	46	307	40
108	48	208	44	308	41
109	55	209	39	309	39
110	45	210	53	310	60
111	62	211	57	311	50
112	44	212	39	312	61
113	43	213	51	313	54
114	41	214	61	314	35
115	38	215	44	315	42
				316	54
				317	55
				318	38
				319	49
				320	54
				321	29
				322	34
				323	45
				324	52
				325	21
$\Sigma X =$	694		714		1130
$\Sigma X^2 =$	32704		34548		53804

$\Sigma X_T = 2538$ $\Sigma X^2_T = 121056$ $C = 117117.2$

$SS_B = 54.27$ $SS_W = 3884.53$ $SS_T = 3938.8$

$n_1 = 15$ $n_2 = 15$ $n_3 = 25$ $N_T = 55$ $k = 3$

TABLE V

INITIAL STATUS OF DIFFERENTIAL
TREATMENT GROUPS ON INFORMATIONAL ACHIEVEMENT

Analysis of Variance Table

Source	df	SS	V	F*
Among Mean Between Groups	2	54.27	27.13	.3632
Within Groups	52	3884.53	74.70	
Totals	54	3938.80		

*The F-value required for significance at the .05 level of confidence for 2 and 52 degrees of freedom is 3.18.

Results of Measures on Criterion Variables

Measurements were taken for the purpose of making comparisons to ascertain whether or not the results obtained indicated statistically significant differences between the relative effectiveness of the three teaching methods in terms of achievement levels and attitudes.

Informational Achievement. Scores attained from written posttests were combined with scores attained on performance tests to provide data with which to make comparisons of achievement levels between the control and the two experimental groups. These scores are shown in Table VI with an analysis of these data reported in Table VII.

TABLE VI

COMPOSITE SCORES OF INFORMATIONAL ACHIEVEMENT -- POSTTESTS COMBINED WITH MEAN SCORES OF PERFORMANCE TESTS

Student Code	Scores Group A_1	Student Code	Scores Group A_2	Student Code	Scores Group A_3
101	106	201	128	301	122
102	137	202	114	302	126
103	156	203	123	303	130
104	122	204	151	304	160
105	150	205	141	305	78
106	117	206	140	306	140
107	132	207	121	307	108
108	138	208	136	308	113
109	131	209	107	309	138
110	143	210	155	310	109
111	148	211	130	311	123
112	130	212	117	312	147
113	139	213	146	313	128
114	117	214	142	314	129
115	146	215	116	315	152
				316	129
				317	137
				318	114
				319	127
				320	130
				321	95
				322	160
				323	94
				324	129
				325	135
$\Sigma X =$	2012		1967		3153
$\Sigma X^2 =$	272622		260927		406931

$\Sigma X^T = 7132$ $\quad \Sigma X^2_T = 940480$ $\quad C = 924825.89$

$SS_B = 645.99$ $\quad SS_W = 15008.12$ $\quad SS_T = 15654.11$

$n_1 = 15$ $\quad n_2 = 15$ $\quad n_3 = 25$ $\quad N_T = 55$ $\quad k = 3$

TABLE VII

INFORMATIONAL ACHIEVEMENT
OF DIFFERENTIAL TREATMENT GROUPS

Analysis of Variance Table

Source	df	SS	V	F*
Among Means Between Groups	2	645.99	322.99	1.12
Within Groups	52	15008.12	288.62	
Totals	54	15654.11		

*The F-value required for significance at the .05 level of confidence of 2 and 52 degrees of freedom is 3.18.

The F-value of 1.12, resulting from comparisons of the informational achievement data, is noted to be below the table value of 3.18 required for significance. Therefore, the null hypothesis (Ho_1) of no significant difference with respect to cognitive outcomes of knowledge, comprehension, and application between the differential treatment groups is accepted.

Performance of Teaching Capabilities. The performance test scores, relative to the capability of each student to make applications of the teaching techniques presented during the experiment, were also utilized in making comparisons to ascertain whether or not there were statistically significant differences between the performance scores attained by degree and non-degree students. The performance test scores assigned by the three industrial education specialists were adjusted to a scale yielding a possible maximum score of 100. A mean score for each student performance was then calculated and used for comparison. The data and analysis by chi-square techniques are reported in Table VIII.

TABLE VIII

ANALYSIS OF ADJUSTED MEAN SCORES OF PERFORMANCE TESTS OF DEGREE AND NON-DEGREE STUDENTS*

Degree		Non-Degree			
Student Code	Score	Student Code	Score	Student Code	Score
203	55	305	41	106	71
215	64	321	48	318	72
306	64	323	49	113	73
207	67	101	54	212	73
301	69	308	58	303	73
319	69	310	58	314	73
102	71	311	58	112	74
325	71	114	59	320	75
208	72	209	59	103	76
111	76	104	62	105	76
205	78	202	62	213	76
315	79	307	64	302	77
204	80	109	66	110	79
206	80	108	68	316	79
304	83	201	68	107	80
322	83	211	68	115	80
210	89	309	69	214	80
		313	69	312	80
		324	69	317	80

Degree: N = 17 Non-Degree: N = 38 N_T = 55

High Score = 89
Low Score = 41
Range = 48
Range/2 = 24

Below 65 - Low
Above 65 - High

	Degree	Non-Degree	
High	14	26	40
Low	3	12	15
	17	38	55

X^2 = .5542 (Yates Corrected)

*Adjustment factor of 7.692 yields a maximum possible score of 100 on the rating sheet categories. (See Appendix D for copies.) 7.692/11 = .6992 or 70 per cent of the raw performance score. Mean = Summation Adjusted X/N.

It was considered feasible to analyze the independent ratings of the specialists to ascertain whether or not there was agreement among the specialists in their overall ratings. The data were analyzed and tested for significance by the statistical techniques of Kendall's coefficient of concordance W and F-tests as described by Kerlinger.[1] The scores and analysis of the data are shown in Table IX.

Comparison of the data indicates a highly significant degree of agreement among the specialists on the level of student performance.

It was considered feasible to make further comparisons to ascertain whether or not there was significant correlation between scores attained on the written informational achievement posttests with those attained on the performance tests. The data were analyzed by calculating a Pearson product-moment correlation coefficient of ungrouped data and tested for significant departure from zero. The obtained t-value of 4.047, as reported in Table X, indicates a correlation significant from zero.

The analysis of the performance test scores in Table VIII indicates a non-significant chi-square value of .5542. These data are further strengthened by significant agreement among the industrial education specialists as indicated by the analysis of the data reported in Table IX, and by a significant departure from zero of the correlation between achievement scores and performance scores as reported in Table X. Therefore, the null hypothesis (H_{o_1}) of no significant difference with respect to the application of teaching techniques between degree and non-degree students is accepted.

Attitude Toward the Course. The attitude rating scores, as reported in Table XI, were analyzed to ascertain whether or not there were statistically significant differences in attitudes toward the subject F390 Principles of Teaching Industrial Subjects between the differential treatment groups. The one-way analysis of variance and F-tests, as reported in Table XII, revealed an F-value of

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[1]Fred N. Kerlinger, Foundations of Behavioral Research (New York: Holt, Rinehart and Winston, Inc., 1964), pp. 267-270.

TABLE IX

COMPOSITE SCORES OF INDUSTRIAL EDUCATION SPECIALISTS' RATINGS OF PERFORMANCE TESTS

Student Code	Ratings Spec.$_1$	Ratings Spec.$_2$	Ratings Spec.$_3$	Σ	$\Sigma - \bar{\Sigma}$
101	71	76	86	233	- 67.38
102	92	114	98	304	3.62
103	115	108	99	322	21.62
104	86	86	95	267	- 33.38
105	120	104	102	326	25.62
106	98	102	106	306	5.62
107	111	122	114	347	46.62
108	89	94	107	290	- 10.38
109	96	94	94	284	- 16.38
110	110	113	116	339	38.62
111	111	105	107	323	22.62
112	87	113	117	317	16.62
113	94	113	110	317	16.62
114	79	74	100	253	- 47.38
115	111	110	123	344	43.62
201	101	86	104	291	- 9.38
202	84	87	94	265	- 35.38
203	68	74	93	235	- 64.38
204	114	107	122	343	42.62
205	100	122	115	337	36.62
206	113	107	126	346	45.62
207	87	95	106	288	- 12.38
208	110	79	119	308	7.62
209	88	73	96	257	- 43.38
210	134	111	136	381	80.62
211	100	91	99	290	- 10.38
212	96	97	120	313	12.62
213	110	102	114	326	25.62
214	118	109	119	346	45.62
215	96	95	87	278	- 22.38
301	98	95	103	296	- 4.38
302	113	114	103	330	29.62
303	103	95	118	316	15.62
304	122	109	122	353	52.62
305	55	50	71	176	-124.38
306	90	91	95	276	- 24.38

(continued next page)

TABLE IX (continued)

COMPOSITE SCORES OF INDUSTRIAL EDUCATION SPECIALISTS' RATINGS OF PERFORMANCE TESTS

Student Code	Ratings Spec.$_1$	Ratings Spec.$_2$	Ratings Spec.$_3$		
307	92	79	106	277	- 23.38
308	76	81	92	249	- 51.38
309	105	105	85	295	- 5.38
310	92	71	87	250	- 50.38
311	70	82	99	251	- 49.38
312	119	117	108	344	43.62
313	86	105	107	298	- 2.38
314	119	96	100	315	14.62
315	117	113	109	339	38.62
316	129	104	106	339	38.62
317	118	109	117	344	43.62
318	114	96	100	310	9.62
319	121	75	99	295	- 5.38
320	110	85	125	320	19.62
321	69	66	73	208	- 92.38
322	125	119	114	358	57.62
323	55	79	76	210	- 90.38
324	108	93	92	293	- 7.38
325	97	96	110	303	2.62

$N = 55$ $\quad k = 3$ $\quad \Sigma_T = 16521$

$\bar{\Sigma} = \Sigma_T / N$ $\quad \Sigma = 300.38$

$S = (\Sigma_1 - \bar{\Sigma})^2 + (\Sigma_2 - \bar{\Sigma})^2 + \ldots\ldots (\Sigma_n - \bar{\Sigma})^2$

$S = (-67.38)^2 + (3.62)^2 + \ldots\ldots (2.62)^2 = 94790.98$

$$\text{Concordance } W = \frac{12S}{k^2 (N^3 - N)} = .7599$$

$$F = \frac{(k-1)W}{1-W} = 6.33^* \qquad df = 2 \text{ and } 52$$

*Critical value of F with 2 and 52 df at .05 level of significance is 3.18.

TABLE X

COMPOSITE SCORES OF INFORMATIONAL ACHIEVEMENT POSTTESTS AND ADJUSTED MEAN PERFORMANCE TEST SCORES

Student Code	Achievement Score - X	Performance Score - Y
101	52	54
102	66	71
103	80	76
104	60	62
105	74	76
106	46	71
107	52	80
108	70	68
109	65	66
110	64	79
111	72	76
112	56	74
113	66	73
114	58	59
115	66	80
201	60	68
202	52	62
203	68	55
204	71	80
205	63	78
206	60	80
207	54	67
208	64	72
209	48	59
210	66	89
211	62	68
212	44	73
213	70	76
214	62	80
215	52	64
301	53	69
302	49	77
303	57	73
304	77	83
305	37	41

(continued next page)

TABLE X (continued)

COMPOSITE SCORES OF INFORMATIONAL ACHIEVEMENT
POSTTESTS AND ADJUSTED MEAN PERFORMANCE TEST SCORES

Student Code	Achievement Score - X	Performance Score - Y
306	76	64
307	44	64
308	55	58
309	67	69
310	51	58
311	65	58
312	67	80
313	59	69
314	56	73
315	73	79
316	50	79
317	57	80
318	42	72
319	58	69
320	55	75
321	47	48
322	77	83
323	45	49
324	60	69
325	64	71

$\Sigma X = 3284$ $\Sigma Y = 3846$

$N = 55$ $\Sigma x^2 = 201416$ $\Sigma Y^2 = 274126$ $\Sigma XY = 232195$

$\Sigma x^2 = 5331.34$ $\Sigma y^2 = 5185.71$ $\Sigma xy = 2553.04$

$r = .486$

$t = r\sqrt{N-2/1-r^2} = 4.047$ $df = 53$

TABLE XI

COMPOSITE SCORES OF ATTITUDE
TOWARD THE SUBJECT

Scores Group A_1	Scores Group A_2	Scores Group A_3
8.1	8.5	8.5
8.5	8.3	8.5
8.7	8.5	8.7
8.7	8.5	8.9
8.9	8.5	8.1
8.3	8.7	8.9
8.9	8.5	8.1
8.3	8.7	8.1
8.3	8.1	8.5
8.7	8.9	8.9
8.7	8.7	7.7
8.9	8.7	8.5
7.1	8.3	8.5
8.5	8.3	8.3
8.5	8.1	8.5
		8.5
		9.1
		8.5
		8.5
		8.7
		8.5
		8.5
		8.9
		8.1
		8.5
$\Sigma x =$ 127.1	127.3	212.5
$\Sigma x^2 =$ 1079.83	1081.11	1800.61
$\Sigma x_T =$ 466.90	$\Sigma x^2_T =$ 3969.59	C = 3943.35
$SS_B =$ .01	$SS_W =$ 6.02	$SS_T =$ 6.03
$n_1 =$ 15 $n_2 =$ 15	$n_3 =$ 25 $N_T =$ 55	k = 3

TABLE XII

ANALYSIS OF ATTITUDE RATINGS TOWARD THE SUBJECT BY DIFFERENTIAL TREATMENT GROUPS

Analysis of Variance Table

Source	df	SS	V	F*
Among Means Between Groups	2	.01	.005	.0432
Within Groups	52	6.02	.1157	
Totals	54	6.03		

*The F-value required for significance at the .05 level of confidence for 2 and 52 degrees of freedom is 3.18.

.0432, which is substantially below the table value of 3.18 required for significance. Therefore, the null hypothesis (Ho_3) of no significant difference with respect to attitude toward the course between the differential treatment groups is accepted.

Attitude Toward the Practice. The attitude rating scores, as shown in Table XIII, were analyzed to ascertain whether or not there were statistically significant differences in the attitudes toward the practice of offering the course by the three different teaching methods. The data were analyzed by one-way analysis of variance and F-tests and are reported in Table XIV.

The F-ratio of 2.29 indicates that the differences in attitude toward the practice of offering the course by different teaching methods are not statistically significant. Therefore, the null hypothesis (Ho_4) of no significant difference, with respect to attitude toward the practice of offering the course by extension during the fall semester of 1969-70, between the differential treatment groups is accepted.

TABLE XIII

COMPOSITE SCORES OF ATTITUDE
TOWARD THE PRACTICE

Scores Group A_1	Scores Group A_2	Scores Group A_3
8.5	8.5	8.5
8.5	8.5	8.5
9.2	8.7	8.5
9.1	8.9	8.5
8.7	8.7	8.9
6.0	8.7	8.9
8.1	6.5	8.5
8.5	8.9	8.9
8.7	7.3	8.1
8.1	8.9	8.1
9.1	8.5	8.5
8.5	8.5	4.2
8.5	8.5	5.5
8.3	8.3	4.2
8.7	6.0	5.1
		9.2
		5.1
		5.1
		9.2
		8.1
		8.1
		7.3
		8.3
		8.3
		8.7
Σx = 126.6	123.4	190.3
Σx^2 = 1074.69	1026.38	1513.17

Σx_T = 440.20 $\quad \Sigma x^2_T$ = 3614.24 $\quad C$ = 3523.20

SS_B = 7.35 $\quad SS_W$ = 83.69 $\quad SS_T$ = 91.04

n_1 = 15 $\quad n_2$ = 15 $\quad n_3$ = 25 $\quad N_T$ = 55 $\quad k$ = 3

TABLE XIV

ANALYSIS OF ATTITUDE RATINGS TOWARD THE PRACTICE OF OFFERING THE COURSE BY DIFFERENT TEACHING METHODS

Analysis of Variance Table

Source	df	SS	V	F*
Among Means Between Groups	2	7.35	3.68	2.29
Within Groups	52	83.69	1.61	
Totals	54	91.04		

*The F-value required for significance at the .05 level of confidence for 2 and 52 degrees of freedom is 3.18.

Cost Analysis. The cost analysis presented in Table XV includes direct costs incurred during the time the experiment was being conducted. The figures enclosed in parentheses are projected direct costs of a traditional teaching load of three extension classes per instructor. With four locations involved, this would require the equivalent of one and one-third instructors on a regular teaching schedule compared to one instructor employed during this experiment.

Instructor costs were figured on a base salary of $10,400.00. This is less than a professorial salary schedule range, but is greater than a potential salary that would be paid to a locally qualified person to teach a class on a part-time basis. Travel and subsistence costs were calculated with Columbia as the point of origination. Therefore, instructor costs as well as travel costs are contingent upon particular types of arrangements.

The Extension Division of the University of Missouri--Columbia leases and maintains telelecture equipment. The prorated costs of telelecture equipment per unit, used in

TABLE XV

COMPARISON OF DIRECT COSTS BETWEEN THIS EXPERIMENT
AND A REGULAR THREE-CLASS-TEACHING-LOAD SCHEDULE OF ONE SEMESTER

Item	Marshall		Kansas City		Hannibal Joplin	Hannibal	Joplin
Instructor:	1278.00	(1278.00)	1278.00	(1278.00)	1278.00	(1278.00)	(1278.00)
Travel	221.00	(221.00)	247.00	(466.00)	127.00	(308.00)	(876.00)
Food	38.00	(38.00)	54.00	(102.00)	20.00	(102.00)	(136.00)
Lodging	-	(-)	-	(170.00)	20.00	(170.00)	(170.00)
Assistant	-	(-)	54.96	(-)	109.92	(-)	(-)
Secretarial	280.00	(280.00)	280.00	(280.00)	280.00	(280.00)	(280.00)
Supplies and Instr. Material	75.00	(75.00)	75.00	(75.00)	150.00	(75.00)	(75.00)
Telephone:							
Regular Tolls	5.45	(5.45)	5.45	(5.45)	10.90	(5.45)	(5.45)
Telelecture - Monthly Unit Rental*	-	(-)	**61.40 ***20.47	(-)	322.89	(-)	(-)
Telelecture Toll	-	(-)	336.07	(-)	1553.50	(-)	(-)
Subtotals	1897.45	(1897.45)	2412.35	(2376.45)	3872.21	(2218.45)	(2820.45)

Totals: This Experiment--$8182.01 Traditional Schedule--$9312.80 Difference--$1130.79

Figures in parentheses indicate traditional costs at a base salary of $10,400.00.

*Prorated, including originating telelecture equipment rentals - Columbia.
**Paid from University-wide funds.
***Prorated share - Columbia.

cooperation with the Extension Division during this experiment, were based on rental charges of the following:

Audio: Western Electric Conference Set, Model KS-19134.

Data: Telephone Set, No. 601B.

Writer: Victor Electronic Remote Blackboard, with transmitter, receiver and overhead projector.

One unit was used for transmission from Columbia, Missouri, to the three receiving units at Kansas City, Hannibal and Joplin, Missouri. This type of equipment requires technical assistance at both the transmitting and receiving stations.

The cost analysis, based upon the equipment and procedures used in this experiment, as explained above and as reported in Table XV, indicates a net savings of $1130.79 over the projected traditional teaching costs.

Travel Status of Instructor

Extension classes necessitate travel on the part of the teacher-educator. Table XVI shows the travel time involved in this experiment compared to a regular teaching schedule with the instructor meeting his class each week face to face.

The difference between instructor travel on the basis of this experiment and traditional traveling to the same locations is three hundred and eight hours. This is the equivalent of seven and seven-tenths forty-hour work weeks.

TABLE XVI

ROUND-TRIP TRAVEL TIME IN CLOCK HOURS REQUIRED BY AUTOMOBILE FROM COLUMBIA TO THE SPECIFIED LOCATIONS FOR ONE SEMESTER - 17 MEETINGS

Location of Classes	Travel Required This Experiment	Travel Required Regular Schedule
Marshall	34	34
Kansas City	54	102
Hannibal	5	85
Joplin	24	204
Total Hours	117	425

CHAPTER V

CONCLUSIONS AND IMPLICATIONS

To the extent that the findings of the study are reliable and valid, and to the extent that the sample population represents the total population, the following conclusions may be drawn:

A professional course such as F390 Principles of Teaching Industrial Subjects may be presented to heterogeneous groups by either the traditional method of face-to-face lecture-discussion; by combining 50 per cent face-to-face lecture-discussion with 50 per cent telelecture presentations; or by presenting the entire course by telelecture methods. The mean achievement levels appear to be equivalent.

Since student attitude was positive toward the subject and toward telelecture, as measured at the conclusion of the experiment, it is concluded that adult student attitudes will not be adversely affected by either the course content or the method of presentation.

To the extent that the course objectives were measured, they were achieved in an equivalent manner by each of the three methods investigated.

Under the conditions of this experiment, telelecture was more economical in costs and in teacher travel time. Therefore, telelecture may be utilized without jeopardizing outcomes or entailing extra costs.

Implications

Based on the findings and conclusions of this study, the following implications appear to be in order:

Since achievement levels of the three groups studied appear to be equivalent in relation to knowledge, comprehension and application, administrators may wish to make increased use of telelecture as a means to offer professional courses by extension. They may also wish to

explore other related applications of telelecture on a short-term basis or in combination with other mediums.

The attitudes of the students indicate that adults will cooperate with efforts to explore different means of providing in-service training. Therefore, adult student attitude should not be considered a deterrent in utilizing a medium such as telelecture.

A teacher-educator may be scheduled to teach by telelecture in geographically separated locations either separately or simultaneously, thus providing greater specialized educational opportunities to more areas of the state.

Teacher-educator time normally spent in traveling could be utilized for other educational purposes such as research and planning. This flexibility appears to allow more control over fixed and variable educational costs. This implies further, that a cost analysis could be developed in such a manner that the findings could be generalized on a unit basis.

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APPENDIX A

Letter by B. W. Robinson

B. W. ROBINSON
ASSISTANT COMMISSIONER

DIRECTOR
VOCATIONAL EDUCATION

DEPARTMENT OF EDUCATION
STATE OF MISSOURI
JEFFERSON CITY

May 29, 1969

Dr. H. H. London
Professor of Industrial Education
University of Missouri
Columbia, Missouri 65201

Dear Dr. London:

We have reviewed with interest the research proposal developed by Mr. Franklin King. As we interpret its provisions and scope, we think it has real meaning for Missouri. Certainly there is a valid opportunity for implementation in our State.

We endorse with enthusiasm this proposal. If there is anything further we can do to facilitate its funding, we will be pleased to do so.

Sincerely,

B. W. Robinson
Assistant Commissioner
Director, Vocational Education

BWR/rc

APPENDIX B

Course Objectives

COURSE OBJECTIVES

Through experiences provided by this course, the student should be able to:

A. Explain the role of the Practical Arts and Vocational-Technical educator, his professional duties and responsibilities.

B. Identify the personal and professional characteristics that make the greatest contribution to the teacher's success.

C. Discuss the factors that affect learning in the classroom or laboratory.

D. Formulate plans to successfully meet his classes and to get them to work quickly and efficiently.

E. Compare the features of the various types of aids and devices that will contribute to the effectiveness of the teaching-learning process.

F. Demonstrate orally the techniques and methods of presenting technical and related informational materials.

G. Objectively critique a video tape of his own performance.

H. Make comparisons of the methods found to be effective by successful teachers in maintaining pupil control.

APPENDIX C

Content and Scope of the Course

CONTENT AND SCOPE OF THE COURSE

Unit I	Introduction: A brief Overview of the Industrial Educator's Job
Unit II	Characteristics of the Teacher of Industrial Subjects
Unit III	Learning Theory: Its Application in Industrial Education Classes
Unit IV	Maintaining Pupil Control; Safety and Liability
Unit V	Aids and Physical Devices for Implementing Instruction
Unit VI	Teaching Methods and Techniques
Unit VII	Beginning the School Year: Before the School Begins; Preparing for the First Class; Starting the Class to Work.
Unit VIII	Planning, Selecting and Organizing Facilities, Equipment and Supplies for Industrial Education
Unit IX	Intra-School and Community Relations of the Teacher of Industrial Subjects

APPENDIX D

Midterm and Final Test

UNIVERSITY OF MISSOURI

DEPARTMENT OF PRACTICAL ARTS AND
VOCATIONAL-TECHNICAL EDUCATION

F390 Principles of Teaching Industrial Subjects

MID-TERM

Part I: Multiple-Choice Items

Directions: Each of the questions or incomplete statements listed below is followed by several words, phrases, or series of numbers. From these, you are to choose the one which answers the question or completes the statement correctly. Black in the portion of the answer sheet which corresponds to the item number and the letter of your choice (A, B, C, D, or E).

The first item is answered as an example.

(s) Vocational-Technical education should be taught in such a manner that upon successful completion of the course, the student should be:

A. trained
B. proficient
C. employable
D. graduated
E. retained

The answer is choice (C) because upon successful completion of training the student must be employable. On a regular question you would mark over "C" on your answer sheet with your No. 2 pencil.

- -

1. The total number of vocational education teachers in the United States was 124,042 for the fiscal year 1966. According to the Advisory Council on Vocational Education, this number will increase in the next decade to approximately:

A. 166,063
B. 229,477
C. 248,084
D. 310,105
E. 372,126

2. A mandatory requirement of the Vocational Amendments of 1968 is the establishment of:

   A. local-state expenditure formulas
   B. comprehensive programs
   C. computerized follow-up reports
   D. state advisory committees
   E. rural-urban equalization formulas

3. Specialized education and general education concentrate on:

   A. fundamentals of curriculum development
   B. differences and similarities of individuals
   C. state and federal requirements
   D. North Central Association guidelines
   E. differences of individuals

4. In seeking answers to questions on vocational certification requirements, the employed instructor should first consult the:

   A. State Vocational Director
   B. State Superintendent of Public Instruciion
   C. County Superintendent
   D. Vocational Director
   E. State Plan

5. Professional growth is a process best described as:

   A. planned
   B. continuous
   C. efficient
   D. proficient
   E. technical

6. A summary of recent research comparing teaching personality and teacher effectiveness show results which are:

   A. significant
   B. negative
   C. inconclusive
   D. positive
   E. encouraging

7. Consider the following terms together, then select a statement which most nearly describes them as a group:

self-confidence	physical abilities
race	emotional stability
aptitude	experience
age	educational achievement

   A. related to the "law of readiness"
   B. basis for ability grouping
   C. related to learning theory
   D. ways which individuals differ
   E. psychological backgrounds

8. Which word does not belong in the following series:

   A. touch
   B. taste
   C. kinesthetic
   D. doing
   E. smell

9. Thorndike (1931) concluded after his many experiments that, "all learning is basically the same." Modern learning theorists believe that learning should be classified according to:

   A. Thorndike variations
   B. its prerequisites
   C. sets of theory
   D. descending value
   E. multiple discrimination

10. A very simple description of learning could be:

   A. before and after
   B. situation response
   C. rhythmical response
   D. satisfaction complex
   E. environment

11. A formal description of learning should be developed around the central theme of:

   A. the process of growth
   B. change in human disposition or capability
   C. insight
   D. psychological introspection
   E. the process of physical maturity

12. Keying pre-employment vocational education to job-families rather than highly specialized jobs is based upon:

   A. transfer of learning
   B. Animism
   C. faculty psychology
   D. series of mental states
   E. physiological psychology

13. When courses are broken down into specific assignments for media and classroom teachers, along with feedback arrangements, we should consider this as a part of a:

   A. systems approach
   B. team teaching assignment
   C. conceptual framework
   D. dual approach
   E. programmed instruction approach

14. Trial and error, observation, and doing are directly related to:

A. daily habits
B. environment
C. physical arrangements
D. learning
E. developing an occupational analysis

15. It has been estimated that seventy per cent of the educator's working day is devoted to verbal communication. The estimate of the percentage of time that the untrained worker listens is:

A. 20%
B. 25%
C. 35%
D. 40%
E. 45%

16. The root of opposition to federal support to education is primarily:

A. programming
B. irrelevent
C. economical
D. public apathy
E. parochial

17. The psychological theory which has exerted more influence on education and theology than any other is:

A. Gestalt
B. Animism
C. Faculty
D. Mental States
E. SR Bond

18. The psychological theory which assumes that all behavior can be reduced to mechanical terms is:

A. Herbartian
B. Apperceptive Mass
C. Physiological Psychology
D. Faculty
E. Gestalt

Part II: Modified Analogy-Type Items

Directions: In the following items determine the relationship between the first two parts of the item. Apply this relationship to the third and fourth parts by selecting the proper choice (A, B, C, D or E) to go with the third part. Mark your choice on the answer sheet corresponding with the item number.

The first item is answered as an example:

(s) Parent and child relationship is similar to that of the principal and - ?

A. community
B. teacher
C. curriculum
D. superintendent
E. Board of Education

The correct answer is choice (c) - curriculum. The student should reason that the relationship between the parent and child is that the parent is responsible for the supervision and development of the child. Likewise, from the choices given, the principal is responsible for supervision and development of the curriculum.

---

19. The principal has a similar relationship to the superintendent as the State Director of Vocational Education has to the _ ?

A. State Assistant Commissioner of Education
B. U. S. Commissioner of Education
C. Secretary of Health, Education and Welfare
D. State Commissioner of Education
E. State Commissioner of Special Services

20. The U. S. Office of Education would consider the State Plan for Vocational-Technical Education much as the Board of Education considers the _ ?

A. Responsibility of the Superintendent of Schools
B. Teachers Contract
C. Teachers Plan Book
D. Extra-Legal Agreements
E. National School Board Association

21. Student behavioral change is to teaching success as skill development is to _ ?

A. labor demand
B. specialized high schools
C. curriculum planning
D. parent participation
E. vocational teaching

22. Specialized education is to general education in much the same way as a house is to _ ?

A. a neighborhood
B. the occupant
C. the foundation
D. esthetic values
E. security

23. General education and Industrial Arts go together in much the same way as Vocational Education and _ ?

A. vocational courses
B. skill development
C. vocational guidance
D. terminal education
E. advisory committees

24. General academic and scholastic background but with a weakness of lacking in mechanical skills is one description of a college trained teacher much as a trade teacher could have a good knowledge of standard trade methods but a weakness of _ ?

A. over-emphasis on production
B. lack of appreciation of time values
C. lack of ability and emphasis to cooperate with industry
D. lack of cooperation with labor
E. lack of appreciation of standards of workmanship

25. Mastery of trade or occupation is as necessary for teaching vocational classes as grade school is for _ ?

A. high school
B. vocational classes
C. pride of parents
D. academic subjects
E. rating of school program

26. Enrollment is to program as general is to _ ?

A. actual
B. mobility
C. technical
D. specialized
E. desire

27. An educational system is as dependent upon the student as teaching efficiency is upon _ ?

A. professional growth
B. the teacher
C. daily lesson plans
D. master teaching plan
E. related information

Part III: Modified Matching

Directions: The following items pertain to traditionally accepted personal characteristics or traits of effective teachers. Read the first characteristic or trait, then choose the word which most nearly describes its opposite meaning from the choices provided. Mark your choice (A, B, C, D, or E) on your answer sheet which corresponds with the question number.

Example:

(s) good _ ?

A. vise
B. magnificent
C. indifferent
D. harmful
E. fine

Answer:

Choice "D" (harmful)

- -

28. constructive criticism _ ?

A. censure
B. incompetence
C. potential
D. commendation
E. evasion

29. courteous _ ?

A. ironical
B. magnificent
C. delightful
D. sarcastic
E. delimitable

30. enthusiastic _ ?

A. evasive
B. dull
C. related
D. optimistic
E. deceitful

31. fair _ ?

A. prejudiced
B. priceless
C. unrelated
D. potential
E. rating

32. good health habits _ ?

A. incompetence
B. psychological
C. physiological
D. sloven
E. relative

33. honesty _ ?

A. productive
B. virtue
C. deceitful
D. prejudiced
E. censure

34. morally strong _ ?

A. deceitful
B. vulnerable
C. unprofessional
D. competent
E. skiving

35. optimistic _ ?

A. modern
B. old-fashioned
C. creative
D. desirable
E. under-estimate

36. patient _ ?

A. restless
B. inertia
C. perspective
D. deficit
E. obsolete

37. poise _ ?

A. ruffled
B. fantastic
C. critical
D. relegate
E. punctual

38. professional _ ?

A. pessimistic
B. argumantive
C. evasion
D. representative
E. depersonalized

39. proficient _ ?

A. compatible
B. balanced
C. progressive
D. considerable
E. incompetent

40. tactful _ ?

A. inappropriate
B. de-emphasis
C. repetition
D. informal
E. controlled

UNIVERSITY OF MISSOURI

DEPARTMENT OF PRACTICAL ARTS AND
VOCATIONAL-TECHNICAL EDUCATION

F390 Principles of Teaching Industrial Subjects

FINAL

Part I: Multiple-Choice Items

Directions: Each of the questions or incomplete statements listed below is followed by several words, phrases, or series of numbers. From these, you are to choose the one which answers the question or completes the statement correctly. Black in the portion of the answer sheet which corresponds to the item number and the letter of your choice (A, B, C, D, or E).

The first item is answered as an example.

(s) Vocational-Technical education should be taught in such a manner that upon successful completion of the course, the student should be:

A. trained
B. proficient
C. employable
D. graduated
E. retained

The answer is choice (C) because upon successful completion of training the student must be employable. On a regular question you would mark over "C" on your answer sheet with your No. 2 pencil.

- -

1. Vertical mobility refers to:

A. change in occupational status
B. programs from kindergarten through junior college
C. general plus vocational courses
D. population growth
E. student grouping levels

2. A well-tried pattern for teaching includes the steps of preparation, presentation, application and:

A. doing
B. arranging
C. reporting
D. motivating
E. evaluation

3. For the average student, a greater part of learning can be traced back to its beginning as a result of:

   A. motivation
   B. interest
   C. external causes
   D. environment
   E. sense of sight

4. In the following statements, which one does <u>not</u> belong:

   A. A thoroughly established habit of doing a thing in the most economical way.
   B. Problem solving is a high level of learning.
   C. An integration of a well adjusted neuro-muscular performance.
   D. A product or function of quality and quantities of performance conditioned by and corrected for time.
   E. (There is no choice E.)

5. To those who teach skills, "freeing the mind" should mean:

   A. generalized education is being applied
   B. skills have become habitual
   C. technical information has been learned
   D. related information is important
   E. the teacher trusts his students

6. In the classroom, the key to motivation is:

   A. student ability
   B. parent participation
   C. interest
   D. teacher effectiveness
   E. good equipment

7. The relation of interest to learning is <u>best</u> indicated as:

   A. highly desirable
   B. progressive in nature
   C. indirectly connected
   D. essential
   E. developed

8. Contributors to learning as environment, recognition, friendly atmosphere and testing are best described as:

   A. important
   B. controllable
   C. related
   D. external
   E. teaching

9. The shortest route to self-confidence and success as a teacher is to:

   A. study the teachers' handbook and know all the rules of the school
   B. research teaching methods
   C. establish a friendly relationship
   D. make teaching appealing
   E. prepare for each lesson

10. Beginning class interest can be maintained when the teacher:

   A. has interest
   B. has all new material
   C. puts advanced students with beginners
   D. has an order of business
   E. maintains discipline

11. It is of most importance that inventories of equipment and materials be:

   A. filed conveniently
   B. typed in triplicate
   C. verifiable
   D. technically illustrated
   E. taken at the end of the school year

12. A classroom personnel system:

   A. gives teachers more status
   B. develops leadership
   C. is required in most Area Vocational-Technical Schools
   D. should be organized by students
   E. should be standardized

13. Physical means used by the teacher for the purpose of strengthening the instruction and making it effective is traditionally referred to as:

   A. teaching techniques
   B. teaching devices
   C. programed teaching
   D. technological teaching
   E. teaching aids

14. Identify the item which does not belong in the following list:

   A. instruction sheets
   B. books
   C. showing a motion-picture film
   D. a display of models and mock-ups
   E. a group of sample projects completed

15. To illustrate certain phases of complicated controls and mechanisms, such as hydraulic systems or wiring of an automobile, a teacher should consider a:

A. motion-picture film
B. scale model
C. scale drawing
D. chalk board sketch
E. mock-up

16. A practical approach to a system of programed instruction for the individual teacher is:

A. linear
B. branching
C. simulation
D. adjunct
E. machine

17. The fulfillment of course objectives in an indication of:

A. classroom organization
B. vocational desires
C. classroom management
D. supervisory traits
E. teaching effectiveness

18. Years ago, Will Rodgers coined the phrase, "It's like sitting on a fence post and watching yourself walk by." In a modern setting, this is a fitting description of:

A. supervised teaching
B. team teaching
C. superimposed teaching
D. in-service teaching
E. microteaching

19. The foundation for accurate and up-to-date plans for teaching should be easily traced to:

A. correct teaching methods
B. an analysis
C. techniques for teaching
D. textbooks
E. industry

20. In presenting an information topic, the teacher would most likely use a/an:

A. outline
B. course analysis
C. notebook
D. step-of-procedure plan
E. student assistant

21. An objective critique of one's own performance means:

A. self-determining study
B. a potential salary raise
C. using personality traits
D. use of predetermined evaluation items
E. all of these

22. Which of the following best completes the statement, "safety rules...

A. can be enforced
B. must be enforced
C. have the school board's approval
D. protect the student
E. are written

23. The percentage of shop accidents involving the use of machines or power equipment is about:

A. 50%
B. 60%
C. 75%
D. 80%
E. 90%

24. Teacher liability for accidents is governed most closely by proof of:

A. negligence
B. contributory negligence
C. comparative negligence
D. liability insurance clauses
E. violation of save-harmless laws

25. Which one of the following would be most difficult to justify as an element of good discipline in vocational-technical classes:

A. self-discipline
B. order is essential
C. students should respect authority
D. book of rules
E. freedom is essential

26. The signing of a permit by a parent or guardian, along with a declaration that he will not hold the school responsible in case of a student accident, is:

A. a release for the teacher but not the Board of Education
B. a release for both the teacher and the Board of Education
C. the best protection against a parent's claim for damage
D. of doubtful legal significance
E. shows interest and responsibility of a parent

27. Safety instruction can more effectively be given:

A. at the beginning of the school term
B. once each grading period
C. by a safety specialist
D. by utilizing films and slides
E. along with each demonstration

28. A by-product of preparation for interesting and profitable activities is:

A. good discipline
B. group progress
C. individual progress
D. professional growth
E. all of these

29. In reference to discipline, a well developed system of class organization and management best describes the recognized role of:

A. student
B. teacher
C. student personnel system
D. parent involvement
E. advisory committee recommendations

30. The fact that adolescent students are not likely to sit quietly and wait, supports the idea of:

A. discipline
B. close and frequent check of student work
C. group discussion
D. starting the class with definite instructions
E. habits

31. School districts may purchase liability insurance for teachers when:

A. approved by the Board of Education
B. approved by the State Insurance Commission
C. when the American Federation of Teachers is the recognized bargaining agent
D. when a majority of teachers enroll in the program
E. when allowed by state law

32. State laws on eye protection typically require devices meeting the standards developed by:

A. National Association of Manufacturers
B. State Safety Commission
C. American Standards Association
D. National Safety Commission or Council
E. State Legislators

33. Frank Lloyd Wright coined the phrase, "form follows function." This best describes:

A. selection of teaching techniques
B. facility and equipment planning
C. the master schedule
D. modern industrial architecture
E. attitudes of modern students

34. The March issue of IAVE magazine and the April issue of School Shop are traditionally written for the purpose of giving:

A. employment information for both teachers and graduating students
B. curriculum construction ideas
C. audio-visual instruction
D. home workshop promotion
E. facility and equipment planning information

35. To compare safety, capacity and prices of equipment, accessories, and supplies, it is necessary to have:

A. Educational Specifications
B. American Standard Association Specifications
C. Manufacturer's Specifications
D. National Association of Manufacturers Specifications
E. Recognized Distributors

36. As it pertains to student learning, shop appearance is:

A. the teachers responsibility
B. relatively unimportant
C. the communities' responsibility
D. environmental
E. shared responsibility

37. The statement, "A teacher may make a valuable contribution to student morale when he learns and supports the objectives and standards accepted by the Board of Education," suggests:

A. teachers' handbook
B. a guidance program
C. club activities
D. open-house activities
E. extra-curricular responsibilities

38. The first consideration of a soundly based publicity and public relations program should be:

A. radio and TV
B. student attitude and activities
C. open-house and displays
D. exhibits and parent conferences
E. local and school newspapers

39. Local Advisory Committees are most effective when:

A. function is clear
B. all matters are considered
C. consultants are employed
D. members are paid from tax funds
E. a chairman is appointed

40. Statement: "Courses in foundry practice and metal fitting deleted--courses in automation, hydraulics-pneumatics and metal-processing added. School administrators have recommended budget to implement this change." The statement suggests:

A. state requirements are being met
B. federal guidelines endorsed
C. advisory committee recommendations
D. up-to-date occupational analysis
E. North Central Association Accrediting Committee has acted

41. Actions of a Joint Apprentice and Training Committee are governed by:

A. equal representation from trade union and business
B. staggered three year terms
C. state and federal recommendations
D. local advisory committee recommendations
E. State Labor Commission assignments

42. The first step in planning an exhibit is to decide on the spatial arrangements. This basic design problem involves the guiding principle of unity which is best described by:

A. balance
B. rhythm, repetition and dominance
C. variety
D. control of traffic viewing the exhibit
E. all of these

43. To get overall understanding and support of his program, the teacher of vocational-technical education should be aware of the special value of:

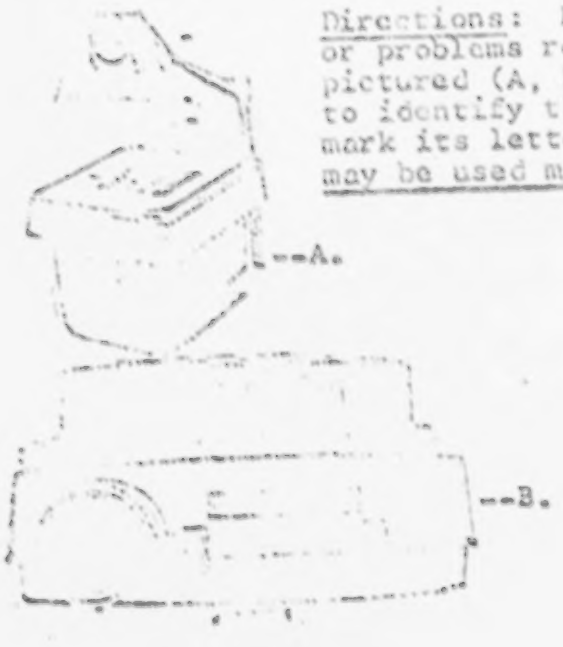
A. written reports
B. working relations with the Superintendent and Principal
C. acceptance of the Vocational Education Director
D. speaking techniques
E. fellow teachers

44. Which one of the following does not belong in this particular list of choices?

A. accuracy
B. speed
C. observation
D. ease
E. confidence

Part II: Modified Multiple-Choice

Directions: Key features, advantages, disadvantages, or problems resulting from the usage of the items pictured (A, B, C, D, or E) are listed below. You are to identify the statement with the correct item and mark its letter on your answer sheet. Any given item may be used more than once or not at all.



45. Will synchronize color slides with sound for automatic instant playback.

46. Not designed for instruction in specific procedures.

47. Most versatile for general classroom use.

48. Developed first to extend the use of low-cost cameras for teaching purposes.

49. Efficient means of evaluating microteaching.

50. Allows teaching materials to be altered almost instantly.

51. Easily adapted to step-by-step procedures.

52. Has great potential for self-analysis.

53. Not designed to be used with similar types of equipment.

54. For ordinary use, the room need not be darkened.

Part III: Modified Multiple-Choice

Directions: Listed below are situation items. Read the situation, select the method of teaching it suggests, and then mark the letter of your choice (A, B, C, D or E) on the answer sheet to correspond with the item number. Note: All methods may or may not be used or a method may apply more than once.

Situations

55. To introduce new and general ideas.

56. When students have some knowledge of the subject matter.

57. Frees the instructor to discuss the most important material.

58. Useful when instructing large groups.

59. When the teacher wants to set an example to follow.

60. A more effective method to use with advanced students rather than beginning students.

Teaching Methods

A. Demonstration or showing method
B. Lecture or telling method
C. Printed instruction or book method
D. Discussion or conference method
E. Discovery or problem-solving method

APPENDIX E

Rating Sheet

UNIVERSITY OF MISSOURI

Department of Industrial Education

EVALUATION SHEET

PRESENTATION

Course number and title_____

Presenter:_____ Basic Method:_____

Topic:_____

Final rating is subjective and is not obtained by adding the scale values.	Excellent (11-10)	Superior (9-8-7)	Adequate (6-5-4)	Poor (3-2-1)
1. Description of setting				
2. Purpose clarified				
3. Appropriateness of method				
4. Poise				
5. Eye contact				
6. Mannerisms (specify)				
7. Voice quality				
8. Vocabulary and clarity of ideas				
9. Grammar and usage				
10. Accuracy of content				
11. Use of aids				
a. Were aids necessary in this presentation?				
12. Organization of content				
13. Summation and closing				

Other items or suggestions:

_____

_____

_____

_____